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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/584,137	08/01/2006	Tadahiro Ohmi	039262-0154	4094
22428 7590 11/05/2008 FOLEY AND LARDNER LLP SUITE 500 3000 K STREET NW WASHINGTON, DC 20007				
EXAMINER				
CHEN, KEATH T				
ART UNIT		PAPER NUMBER		
1792				
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11/05/2008		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/584,137

**Applicant(s)**

OHMI ET AL.

**Examiner**

KEATH T. CHEN

**Art Unit**

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 19 September 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11 and 14 is/are pending in the application.
- 4a) Of the above claim(s) 7-11 and 14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

1. Applicants' amendment of the claims, filed on 09/19/2008, in response to the rejection of claims 1-6 in the first office action mailed on 05/20/2008, by amending claims 1-6, 10, 11, and 14 is acknowledged and will be addressed below.

### ***Election/Restrictions***

2. Claims 7-11 and 14 remain withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention/species, there being no allowable generic or linking claims.

### ***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

1. **Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohmi et al. (US 20030148623, hereafter '623), in view of Kanetsuki et al. (US 20020043341, hereafter '341), Gigl et al. (US 20050211702, hereafter '702), and Moslehi (US 6203620, hereafter '620).**

'623 teaches some limitations of:

Claim 1: A plasma processing apparatus (Fig. 3A) comprising a shower plate (#14, [0051], line 8) having a plurality of ejection holes (#14A, [0051], lines 8-9) for ejecting a gas (from inlet #11p, [0052], last 2 lines), a microwave antenna (#20, [0055], lines 1-2) and a cover plate (#15, [0055]) interposed between said shower plate (#14, [0051], line 8) and said microwave antenna (#20, [0055], lines 1-2).

'623 further teaches alumina shower plate (#14 [0051], lines 4-5) and alumina cover plate (#15 [0052]); and the reason of being able to use low thermal conductivity alumina as shower plate is because the use of antenna as cooling for the shower plate ([0034]). '623 further a continuous space/passage (#14B, Fig. 3B) between the cover plate (#15) and the shower plate (#14); and to suppress plasma discharge in this space ([0074]).

'623 does not teach the other limitations of:

Claim 1: Said cover plate having projections directed to the shower plate with a space left between the cover plate and the shower plate and being formed by a material which has a relative dielectric constant smaller than that of a material of said shower plate so as to suppress an abnormal discharge in the space left between the cover plate and the shower plate.

'341 is an analogous art in the field of microwave plasma process apparatus (abstract; similar to '623, field of the invention), particularly in solving the showerhead thermal stress induced problems ([0015]; similar to '623's accommodating low thermal conductivity material [0034]). '341 teaches thermal stress in showerhead leads to deformation and damage to the showerhead ([0015]).

'702 is an analogous art in the field of microwave sintering (abstract), particularly in providing thermal shock resistant material to reduce fracturing of apparatus

(abstract). '702 teaches silicon nitride ([0014]) withstand thermal stress better than alumina ([0013], lines 5-7).

'620 is an analogous art in the field of plasma assisted semiconductor manufacturing (field of the invention), particularly in ICP (abstract). '620 teaches a cover plate/middle dielectric plate (#306, col. 13, lines 63-64) having projections (portion between #316, col. 13, line 58) directed to the shower plate (#318, col. 13, line 47) with a space (dispersion cavities #316's, col. 13, line 56-61) left between the cover plate and the shower plate (as shown in Fig. 5, similar to the space shown in Fig. 1 of instant Application).

At the time the invention was made, it would have been obvious to a person having ordinary skill in the art to have replaced the cover plate (#15) in Fig. 3A of '623 with silicon nitride, as a material that withstands thermal stress better than alumina, as taught by '702 ([0013], [0014]); and to have replaced the space/passage (#14B) at the top of the shower plate (#14) in Fig. 3A of '623 with dispersion cavities (#316) at the bottom of the cover plate (#306), as taught by '620.

Note the combined apparatus would have had the limitation of: to suppress an abnormal discharge in the space left between the cover plate and the shower plate. When the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (*In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01).

The motivation to replace the cover plate material to SiN would have been to reduce the thermal stress of the showerhead, as taught by '341 ([0015]). The motivation to replace the passage with dispersion cavities would have been simple substitution. It has been held that the simple substitution of one known element for another to obtain predictable results (passage of gas) is obvious (see KSR International Co. V. Teleflex Inc.).

The above combination would have had the limitations of:

Claim 2: A plasma processing apparatus according to claim 1, wherein the material of said cover plate (it is silicon nitride after replacement) is smaller in the relative dielectric constant and is larger in thermal conductivity ( $4 \times 10^{-4}$ , applicant's specification, [0011], line 7) as compared with the material of said shower plate (alumina,  $1 \times 10^{-4}$ , applicant's specification, [0011], line 7).

Claim 3: A plasma processing apparatus according to claim 2, wherein the material of said cover plate is smaller in the relative dielectric constant and larger in the thermal conductivity as compared with the material of said shower plate and further has a dielectric loss of  $1 \times 10^{-3}$  or less in microwave ( $3 \times 10^{-4}$ , applicant's specification, [0020], lines 6-9).

Claim 4: A plasma processing apparatus according to claim 1, wherein the material of said cover plate (#15) contains at least one of silicon nitride (it is silicon nitride after replacement) and quartz and the material of said shower plate (#14)

contains alumina ([0051], lines 4-5).

'623 also teaches some limitations of claim 5 (same as claim 1).

The above combination teaches the other limitations of:

Claim 5: wherein said cover plate comprises a plurality of projection-like portions ('620, portion between #316, col. 13, line 58) contacted with said shower plate at portions at which no ejection holes are present (as shown in Fig. 5) on one of main surfaces (the upper surface) of said shower plate with spaces (dispersion cavities #316's, col. 13, line 56-61) left between the cover plate and the shower plate; wherein said projection-like portions are each formed by obtuse angles or a curved line (concentric rings, col. 14, lines 66-67), when said one of main surfaces (the lower surface) of said cover plate (#306, col. 13, lines 63-64) is seen from the above, and leave a space (dispersion cavities #316's, col. 13, line 56-61) between the cover plate and the shower plate, and wherein said cover plate is formed by a material which has a relative dielectric constant smaller than that of a material of said shower plate (SiN as replaced by the teachings of '341 and '702) so as to suppress an abnormal discharge in the spaces left between the cover plate and the shower plate (inherent property of the structure, see discussion above).

'620 further teaches the limitation of claim 6:

A plasma processing apparatus according to claim 5, wherein said projection-like portions each form a circle (concentric rings, col. 14, lines 66-67, are circles) when said one of main surfaces of said cover plate is seen from the above.

### ***Response to Arguments***

Applicant's arguments filed 09/19/2008 have been fully considered but they are not persuasive.

3. Applicants' argument is that the prior arts do not teach the invention of instant Application that the cover plate having a relative dielectric constant that is smaller than that of shower plate, whereby this structure helps suppress an abnormal discharge between the cover plate and the shower plate.

This argument is not convincing in light of the new grounds of rejection above. Specifically, '341 and '702 together, teaches to replace cover plate of '623 with SiN. The resulting structure would inherently having the properties of suppressing an abnormal discharge between the cover plate and the shower plate.

### ***Conclusion***

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).



A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEATH T. CHEN whose telephone number is (571)270-1870. The examiner can normally be reached on 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. T. C./  
Examiner, Art Unit 1792

/Michael Cleveland/  
Supervisory Patent Examiner, Art Unit 1792